WHAT IS CLAIMED IS:

1. A position sensing apparatus for deriving rotor position of a synchronous machine from signals output from said machine, said apparatus comprising:

a bandpass filter that filters phase voltage signals output from main stator windings of said synchronous machine during AC excitation, thereby extracting a rotor position-indicating component from said phase voltage signals;

a converter that converts the filtered phase voltages into balanced two-phase quadrature signals, said balanced two-phase quadrature signals indicating positioning of said rotor; and

an excitation controller for controlling AC excitation frequency as a function of rotor speed, thereby increasing a position detection range of said position sensing apparatus.

2. The position sensing apparatus of claim 1, wherein said synchronous machine is a synchronous brushless machine.

3. The position sensing apparatus of claim 1, wherein said rotor is on a shaft coupled to a gas turbine engine of an aircraft.

4. The position sensing apparatus of claim 1, wherein said bandpass filter has a fixed passband over a range of rotor speeds.

5. The position sensing apparatus of claim 4, wherein the fixed passband is defined as a function of :

$$f_{sig} = 2 \bullet N_{ph} \bullet f_{init} + f_{e\_st} \bullet (4 \bullet N_{ph} \pm 1)$$

wherein f_{sig} is a frequency of a signal containing rotor position information, N_{ph} is a number of phases in an exciter stator, f_{e_st} is the electrical frequency of a main stator voltage, and f_{init} is an initial AC excitation frequency.

6. The position sensing apparatus of claim 1, wherein the two-phase quadrature signals are used as inputs to emulate a position sensor in a drive system for the synchronous machine.

7. The position sensing apparatus of claim 6, wherein the two-phase quadrature signals are used as inputs to emulate a resolver.

8. The position sensing apparatus of claim 1, wherein a Clarke transformation is used to convert the filtered phase voltages into the balanced two-phase quadrature signals.

9. The position sensing apparatus of claim 1, wherein AC excitation amplitude is maintained substantially constant over a range of rotor speeds.

10. The position sensing apparatus of claim 1, wherein AC voltage at output terminals of the machine is maintained below a preset level due to a field weakening caused by the AC excitation frequency control.

11. The position sensing apparatus of claim 1, wherein said excitation controller varies AC excitation frequency to substantially maximize the ratio between a phase voltage frequency component carrying rotor position information and a rotor frequency component.

12. A position sensing method for deriving rotor position of a synchronous machine from signals output from said machine, said method comprising:

bandpass filtering phase voltage signals output from main stator windings of said synchronous machine during AC excitation, thereby extracting a rotor position-indicating component from said phase voltage signals;

converting the filtered phase voltages into balanced two-phase quadrature signals, said balanced two-phase quadrature signals indicating positioning of said rotor; and

controlling AC excitation frequency as a function of rotor speed, thereby increasing the position detection range of the position sensing method.

13. The position sensing method of claim 12, wherein said synchronous machine is a synchronous brushless machine.

14. The position sensing method of claim 12, wherein said rotor is on a shaft coupled to a gas turbine engine of an aircraft.

15. The position sensing method of claim 12, wherein said bandpass filtering is performed using a fixed passband over a range of rotor speeds.

16. The position sensing method of claim 15, wherein the fixed passband is defined as a function of :

$$f_{sig} = 2 \cdot N_{ph} \cdot f_{init} + f_{e\_st} \cdot (4 \cdot N_{ph} \pm 1)$$

wherein f_{sig} is a frequency of a signal containing rotor position information, N_{ph} is a number of phases in an exciter stator, f_{e_st} is the electrical frequency of a main stator voltage, and f_{init} is an initial AC excitation frequency.

17. The position sensing method of claim 12, wherein the two-phase quadrature signals are used as inputs to emulate a position sensor in a drive system for the synchronous machine.

18. The position sensing method of claim 17, wherein the two-phase quadrature signals are used as inputs to emulate a resolver.

19. The position sensing method of claim 12, wherein a Clarke transformation is used to convert the filtered phase voltages into the balanced two-phase quadrature signals.

20. The position sensing method of claim 12, wherein AC excitation amplitude is maintained substantially constant over a range of rotor speeds.

21. The position sensing method of claim 12, wherein the AC voltage at output terminals of the machine is maintained below a preset limit due to a field weakening caused by the AC excitation frequency control.

22. The position sensing method of claim 12, wherein said AC excitation frequency control varies AC excitation frequency to substantially maximize the ratio between a phase voltage frequency component carrying rotor position information and a rotor speed frequency component.